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Rose Insects and Diseases

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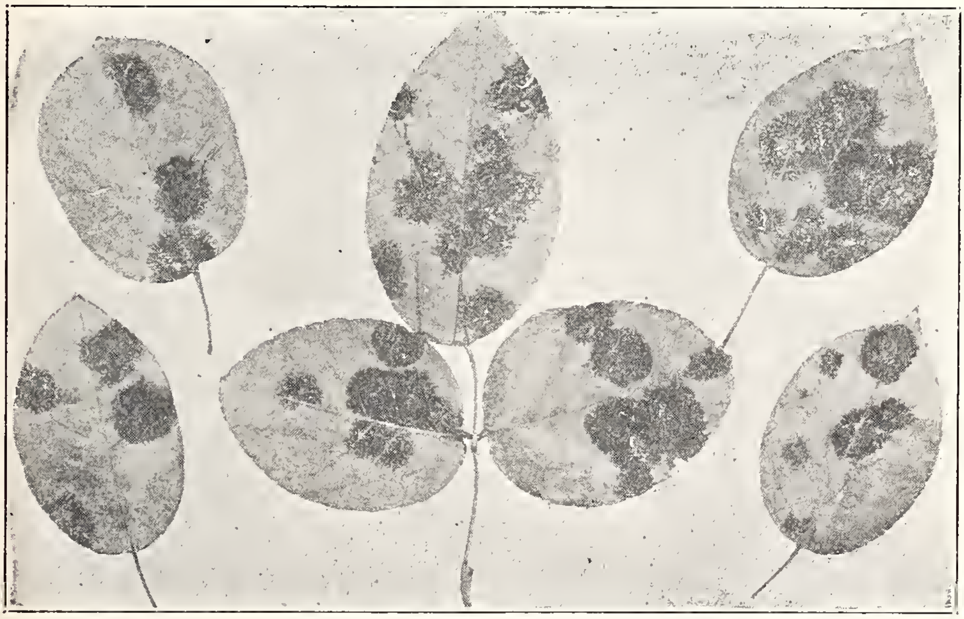

Rose Leaves With Leaf Blotch

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Rose Insects and Diseases

By T. L. Guyton and W. A. McCubbin[1]
Bureau of Plant Industry

It is often a bitter disappointment to rose lovers when plants which they have chosen with care and grown with high expectations, suddenly develop diseases or insect troubles which disfigure their loveliness and render them unattractive and unsightly.

Most common rose troubles are comparatively easy to control. For this reason the following notes on insect pests and fungus diseases may be of help to rose growers throughout the State.

In addition to the control methods mentioned in connection with each trouble there is given at the end a schedule of treatment designed to enable the rose grower to take care of all the common insects and diseases with the least time and trouble. The schedule is a general one and is therefore subject to modification.

Insect Enemies of the Rose

SCALE INSECTS. Two scale insects are frequently found on roses: The rose scale (*Aulacaspis rosea* Bouche) (See Fig. 1) and the San Jose scale (*Aspidiotus perniciosus* Comst.) These small insects are found on the canes and may become very numerous before they are noticed by the grower. The individual scale is flat, dirty colored and about the size of a pin head. In colonies they are so numerous as to form flake-like patches on the canes. Because of its light color the rose scale is more noticeable than the San Jose scale. These insects do much damage to unsprayed rose canes, killing out the plant completely in some cases.

The remedy is a dormant spray with either lime-sulfur solution diluted one to seven with water, or one of the dormant spray oils diluted as directed on the container.

APHIDS OR PLANT LICE (*Macrosiphum rosea* and others). There are several species of aphids found on roses. These insects are small, soft-bodied insects usually found on the leaves and young stems. (See Fig. 2). Aphids multiply at an extremely rapid rate; a single female has been known to produce 76 offspring in two weeks, and at the end of that time some of the first born were starting to reproduce. In the first part of the season all the individuals on a rose plant are females capable of producing living young. These insects spend the winter on the rose as dark, shining eggs. One species, *Macrosiphum solanifolii,* leaves the rose in early summer to go to potato and tomato plants, thus becoming of additional interest to the gardener.

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[1] Photos by H. B. Kirk

Early spraying with a nicotine solution or dusting with a nicotine dust are satisfactory means of control. Two teaspoonfuls of nicotine sulfate containing 40 per cent of nicotine should be used to one gallon of water which has previously been softened by the addition of soap (about an ounce to the gallon.) This solution is thoroughly sprayed on the infested plant; and in cases where there is a heavy infestation the spraying should be repeated in three days. If a nicotine dust can be procured or the grower wishes to prepare the dust himself, it should contain 2 per cent of nicotine and be carried in sulfur, or lime, or both. The preparation of nicotine dusts is given in another part of this bulletin.

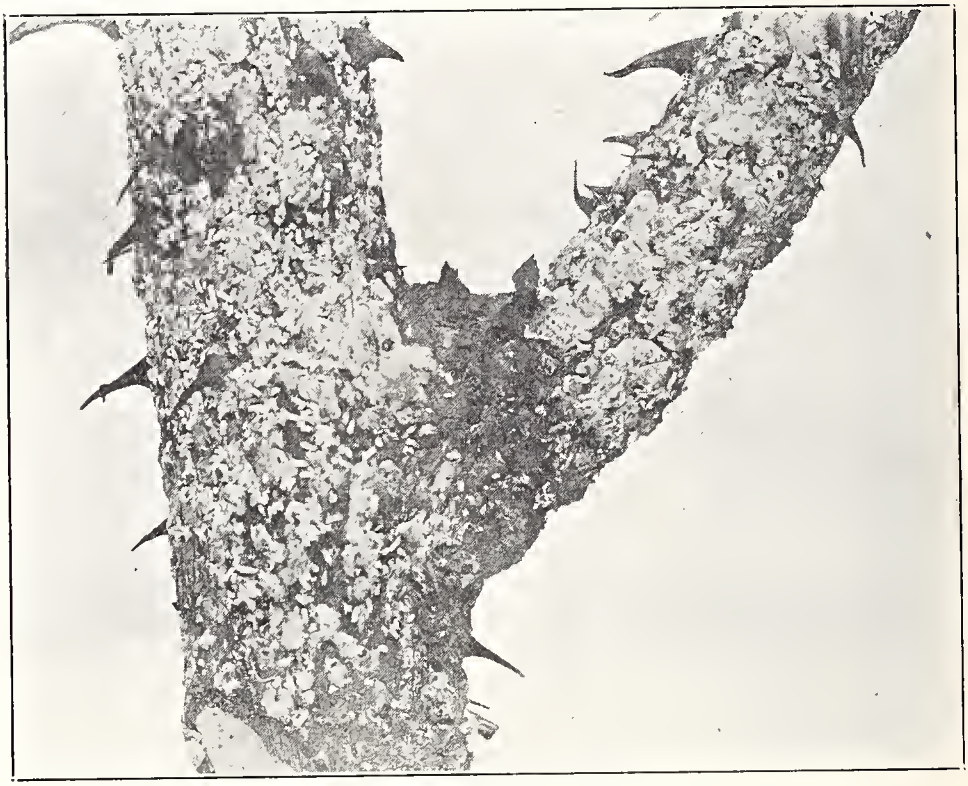

Fig. 1. Rose scale on a rose cane.

ROSE BEETLE (*Macrodactylus subspinosus* Fab.). The rose beetle (See Fig. 3) at times causes considerable concern to the rose grower, attacking as it does the choicest blossoms. Ofttimes the beetles are found in great numbers, damaging the blossoms and the developing buds to such an extent that the entire crop is ruined. These beetles appear in the greatest numbers in sections of the State where the soil is of a sandy nature. The larval, or grub stage, is found in grassland, and feeds upon the roots of grasses, and other organic matter. The beetle has a long list of food plants, and is a primary pest of roses, grapes and ripening fruit. To control the rose beetle is not easy. The most satisfactory method to use where the staining is not to be considered is a spray made by placing 1 gallon of molasses in 50 gallons of water and adding 2 pounds of powdered arsenate of lead. This spray will make rose foliage very unattractive from the stain which it produces. A spray recommended for the control of the Japanese beetle composed of 2 pounds of arsenate of lead, 2 pounds of wheat flour in 50 gallons water is also effective. Mix the flour and arsenate of lead together, and make into a thin paste by addition of water, add this to the required amount of water. This spray also stains the foliage. Dust-

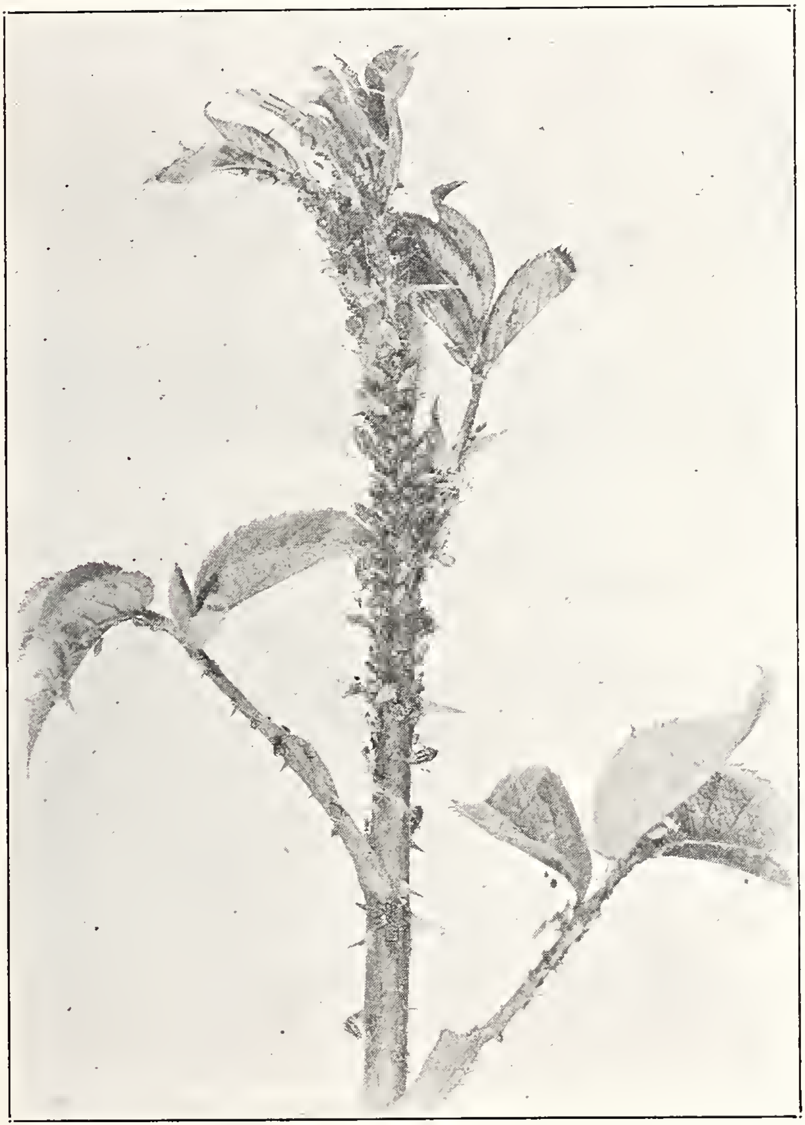

Fig. 2. Plant lice on developing rose shoot.

ing of the plants with a 90-10 dusting mixture serves as a repellent to the beetle, and does not greatly mar the foliage of the plants. This dusting may be repeated at intervals of every day or two until the beetle season is over. The length of the beetle season is from ten days to two weeks.

A thorough cultivation of headlands and fence-rows in large plantings of roses will do much toward reducing the beetle population by destroying the grassland in which the young grubs, or larvae are found.

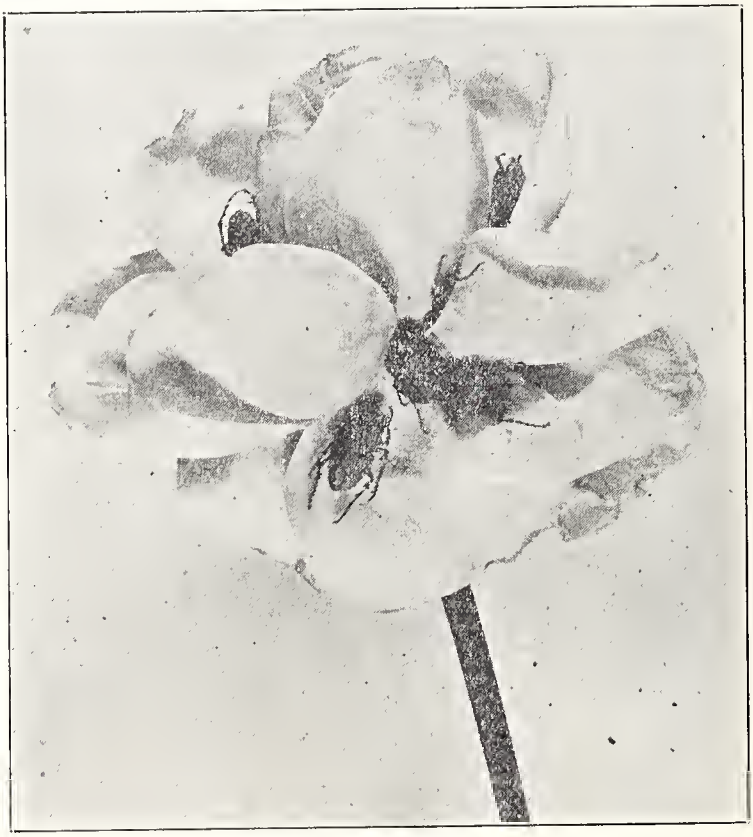

Fig. 3. The Rose Beetle.

JAPANESE BEETLE *(Popillia japonica Newm.)*. In the districts where the Japanese beetle is found, trouble is experienced by rose growers from the attack of this insect on the foliage and flowers of their plants. (See Fig. 4). This insect, as is indicated by its name, was accidentally introduced from Japan into United States in the vicinity of Philadelphia.

The control measures as given for the rose beetle will do something toward controlling the Japanese beetle, particularly the arsenate of lead-flour spray.

The Japanese beetle like the rose chafer spends its larval or grub stage in the ground feeding on the roots of grasses, and in districts where the infestation is high the grubs constitute a very serious pest of lawns, and golf greens.

THRIPS ON ROSES. (*Thrips tabaci* Lind. and others). Frequently the buds of roses fail to open, and growers are at a loss to explain the reason for this. Practically always the reason is the attack of a very small black insect which feeds on the petals near their base, and so effects the buds that they fail to open. Another symptom of thrips attack is the rapid falling of open flowers and the formation of petals which are off color. They also cause a silvering of the leaves.

These small insects are frequently found in large numbers in rose buds. The little creatures are quite active when disturbed, and it frequently is a difficult task to see them. However, if a bud is torn open over a piece of white paper, the insects will fall out, and may readily be seen.

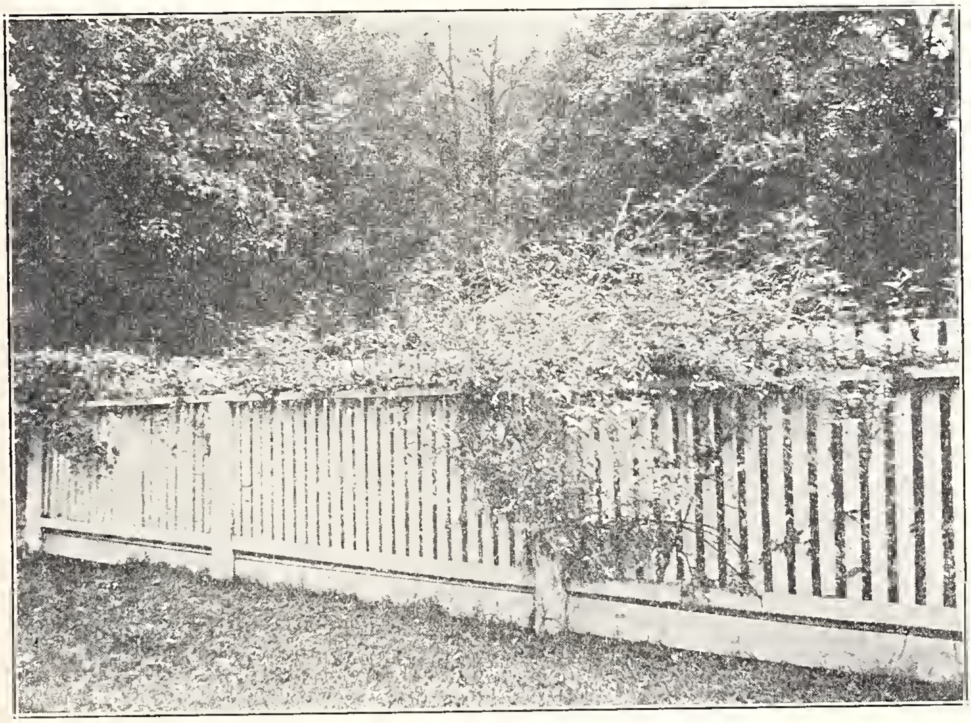

Fig. 4. Rose foliage showing damage due to feeding of Japanese beetle.

The control is the use of nicotine in the form of a dust or spray. This control measure should be made use of before the buds begin to open since it is not possible to control the thrips once they have gained access to the opening flower bud. A nicotine dust containing 1½ to 2 per cent nicotine is very effective, and a spray made by the use of 2 teaspoonfuls of nicotine sulfate containing 40 per cent nicotine in one gallon of water, which has been made soft by the addition of soap, is also effective. It may be necessary to repeat these applications in a day or two.

ROSE SLUGS (*Caliroa aethiops* Yab. and others). There are three species of rose slugs found feeding on the foliage of roses. These slugs are the grub or larval stage of insects known as sawflies. The slugs damage the leaves of the rose by eating off the surface and leaving only the skeleton, and in the case of one species eating out holes in the last stages of its development. (See Fig. 5) Feeding starts on the rose in early spring, and continues until October.

A very satisfactory control is the dislodging of the slugs by means of a stream of water under pressure directed against the leaves. However, if water pressure is not easily available the slugs may be controlled by the use of arsenate of lead, either in the form of a dust mixed with 90 parts of sulfur, or in the form of a spray used at the rate of 10 level teaspoonfuls to 1 gallon of water. The rose grower cannot afford to neglect measures to control these pests since they render the foliage of the rose bush very unsightly.

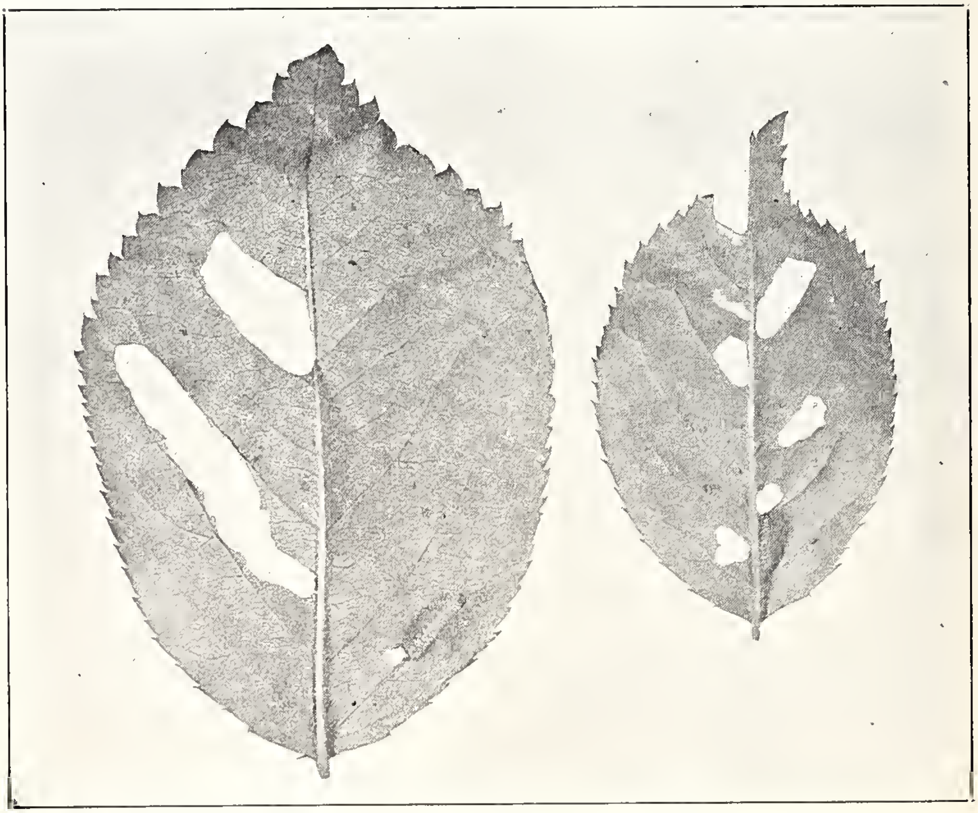

Fig. 5. Sawfly larvae and feeding injury on rose leaves.

Rose Diseases

ROSE MILDEW (*Sphaerotheca pannosa* Wallr.). Mildew is caused by a fungus which grows on the surface of leaves and shoots. The fungus may occur in patches or it may cover the whole surface with its white, frost-like, or dusty coating. (See Fig. 6). Leaves and shoots attacked by mildew are often twisted or distorted and often develop a yellow, sickly color. Badly affected leaves are likely to fall early, and shoots bearing mildew do not ripen normally in late summer but continue to grow and are then easily killed back in winter.

Mildew is particularly prevalent on roses of the Rambler type; on these it is conspicuous on the shoot terminals and on the flower clusters. Attacks on the bud stalks very often prevent the flowers from opening. Roses in shaded, moist locations are also more subject to mildew than those in open, sunny spots with good air drainage.

Sulfur dust is the accepted remedy for rose mildew. If applied as indicated in the spray schedule it will control the mildew without spoiling the appearance of the plants as spray applications are likely to do.

BLACK SPOT OR LEAF BLOTCH (*Diplocarpon rosea* Wolf.). Black or smokey spots on the leaf surface are due to the fungus named. (See Cover Page). The spots may be small or quite large; they are usually circular in outline with a dull black and often radiating appearance; and they cause yellowing and early fall of the leaves. The fungus lives over winter on the spotted leaves and from these spores are produced in spring which infect the new foliage.

Leaf Blotch is comparatively easy to control by spraying or dusting, especially if these are helped out by other garden practices. Of these the most important is the destruction by fire or burial of the old leaves in autumn to prevent the fungus from carrying over the winter. The essential program for control may be summed up in three features: (1) burning or burying the fallen leaves; (2) a dormant spray in spring; and (3) one to three applications of sulfur dust as recommended in the accompanying schedule.

ROSE RUSTS (*Phragmidium subcorticium* (Schr.) Wint., and *Earlea speciosa* (Fr.) Arth.). Of the seven or eight species of rust known to attack roses only two are likely to be encountered in the ordinary rose garden, and these are not common.

One of these is a leaf rust which is oftenest seen on hybrid roses. This rust is distinguishable as small, pustular spots on the under sides of the leaves. When first formed these spots have a bright orange color but turn brick red with age.

If the rust is not plentiful when seen, picking off the few affected leaves is helpful; careful destruction of fallen leaves in autumn is very necessary in the case of this disease; and if these two methods do not keep it in check it may be necessary to apply Bordeaux mixture (4-4-50) at two-weeks intervals during the period of leaf production. In the rare cases where this might be necessary the spraying should be done from below and the leaves coated very thoroughly.

The second species of rust attacks only the stems and petioles, more particularly on the young shoots. The orange-colored powdery spore masses showing from the broken bark, and a marked distortion of the affected shoots, are characteristic of this disease.

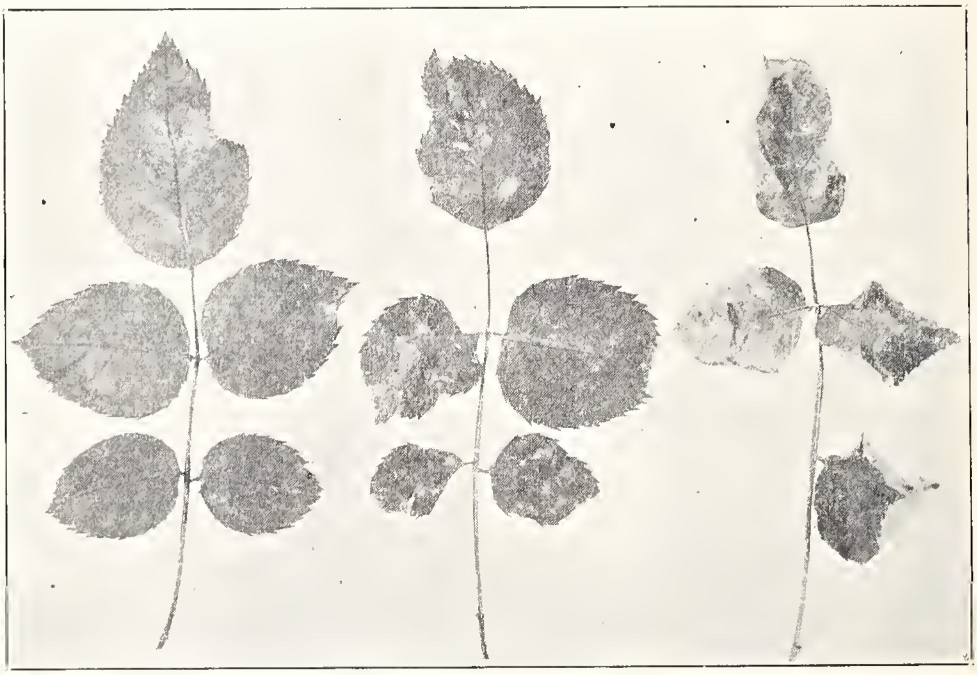

Fig. 6. Rose mildew in various stages of development.

This rust is unlikely to be severe, but in order to reduce the danger of future occurrence it is advisable to cut off and burn the affected shoots when noted.

BROWN CANKER (*Diaporthe umbrina* Jenkins). The brown canker disease of roses has recently been discussed at some length in the American Rose Annual (West Grove, Pennsylvania) by Anna E. Jenkins. According to this author the brown canker disease is one of the worst diseases of out-door roses. The fungus causing the canker makes its entrance into the outer layer of the cane and, spreading from this point, girdles and kills the shoot from that point outward. In the initial stages these cankers form only purplish or reddish spots; as the fungus spreads the affected area takes on a brown or buff color, usually surrounded by a purplish margin. Buds and petals may be attacked by the fungus, but leaves rarely suffer.

The rose grower should take the precaution of excluding from his garden all plants with brown canker. From the nature of the disease it would seem that careful removal and destruction of cankered shoots would check the disease, but this method has been disappointing in practice. On the other hand, very good results followed the use of Bordeaux mixture to protect the canes during the growing season. The number of applications needed will perhaps vary from two or three up to six or seven. In spraying to control this canker the applications should be made so as to cover the canes rather than the foliage, and to aid the spray in sticking it is advisable to add 1 to 2 pounds fish-oil soap to each 50 gallons of Bordeaux. All shoots should be covered thoroughly from both sides.

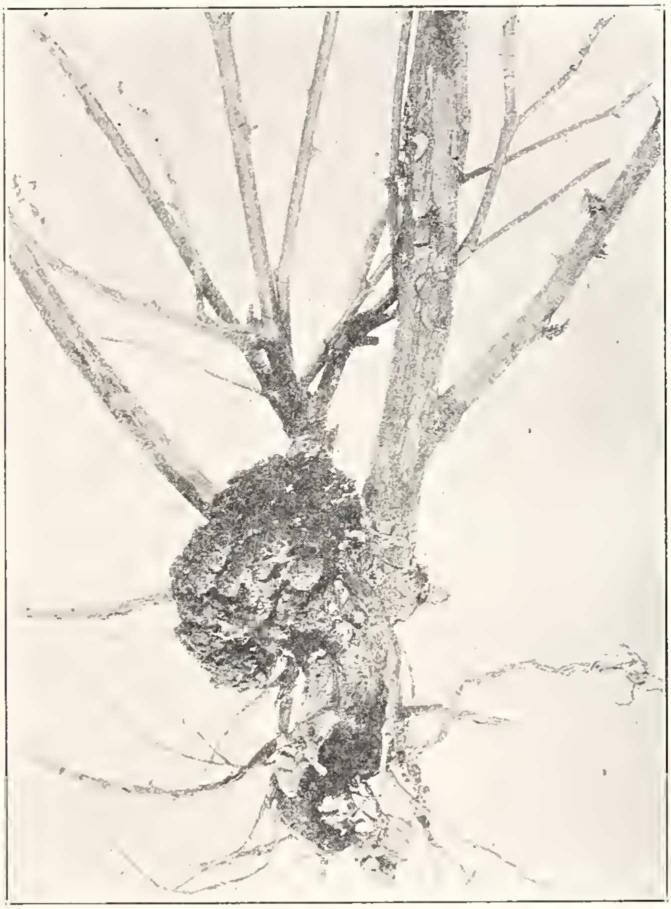

Fig. 7. Crown gall at the base of a rose plant.

CROWN GALL (*Pseudomonas tumefaciens* E. F. Smith). Occasionally slow growing and unhealthy rose plants are found on examination to have large, irregular gall outgrowths on the stock or main roots (Fig. 7). This type of trouble is common on apples and other fruit trees but is much less frequent on roses. The galls in all these cases are due to a definite bacterial parasite which enters by way of wounds and stimulates the tissues into the abnormal gall growth. The effect of such galls is to obstruct sap flow and both top and roots suffer just as if there was a partial girdling.

There is no remedy for plants with large galls on the main stem. Replacement when the plants become too weak to be satisfactory is the only course to follow. It is well to note that in buying rose plants all those which show large or small root galls should be refused or discarded.

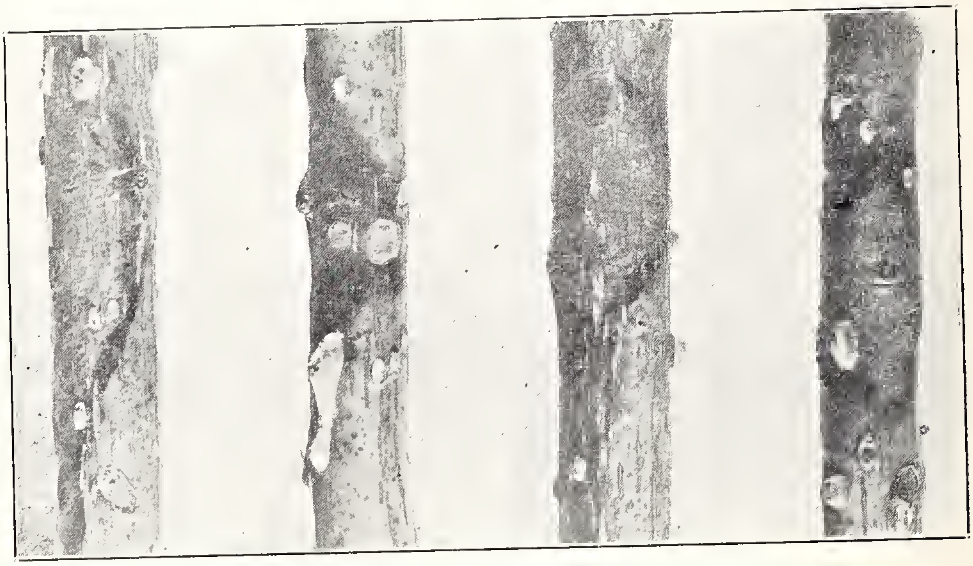

Fig. 8. Rose Canes affected with stem cankers.

STEM CANKER (*Leptosphaeria coniothyrium* (Fckl.) Sacc.). Stem cankers are occasionally met with on rose canes, which are caused by the same fungus that is responsible for the destructive cane blight of raspberries. On the rose the cankers show first as discolored, purplish patches or strips which later dry into depressed areas. They may cause girdling or partial girdling of the cane (Fig. 8) and the foliage above points to this condition by its death or sickliness.

It is fortunate that this type of injury is not so common on rose as on its raspberry host, because it has been found difficult to deal with there. On roses the only measure so far found necessary is to remove cankered canes as soon as possible. The symptoms of death or injury in the foliage often lead to location of cankers of this type which would otherwise be overlooked.

CROWN CANKER (*Cylindrocladium scoparium* Morgan). A very troublesome type of canker known under this name is sometimes prevalent in greenhouse roses, but so far as known out-door plants are not often affected by it. The fungus concerned in this canker works in the outer part of the cane at or below the ground level, girdling the cane completely and bringing about the death of all portions above the girdling. No practical remedy is known and where this disease occurs in gardens the only procedure suggested is to dig out and destroy the affected plant.

FROST CRACKS. Rank growing rose stems are sometimes split open for several inches by the expansion of frost in winter. Such frost cracks are not fatal unless fungi invade the exposed tissues. The chief effect resulting from this type of injury is the development of soft gall-like out-growths along the edges of the crack during the next growing season. Such a line of callus development may be due to infection by the crown gall organism but this is not certain. In any case this abnormal growth in itself does not seem to impair the vigor of the plant. Where it is objectionable or unsightly it is usually possible to replace canes thus affected by new shoots or by judicious pruning.

Notes on General Culture

Roses thrive best in a deep, rather loose, well drained soil of good fertility and medium water holding capacity. Hard earthly soils and those of shallow depth are not suitable. The ideal soil for roses is a rich loam. On this the rose will grow luxuriantly, but other less favorable soils may be used successfully if they are well prepared and fertilized. If hillsides with shallow soil seem to be the only place available probably Rosa rugosa is the only strain suitable for planting under such conditions. One of the best fertilizers to use is well rotted stable manure, which provides the necessary plant food and at the same time supplies humus to the soil. Humus may also be obtained from decayed leaves and other waste vegetable matter which can be incorporated into the soil by cultivation; in such cases needed fertility may be obtained from dried sheep manure or almost any of the commercial fertilizers in a properly balanced combination.

Weekly applications of much diluted liquid manure up to the middle of the blooming season are beneficial. These applications should be made just before rain.

All fertilizers are best if applied in spring when growth starts. When fertilizers are put on after the normal season of vigorous growth they stimulate and prolong vegetative activity into the autumn and thus expose the unripened shoots to the danger of frost injury.

An over rich soil or too much fertilizer tends to make the plants soft and at the same time to delay blooming and reduce the number of flowers. Probably the best indicator of fertilizer needs is the condition of the plant itself; the leaves should be of normal size, dark green in color, and of rather firm texture. When the foliage is small in size, yellow in color and of dry and hard texture starvation is indicated. Lime is not necessary for roses as they grow best in a slightly acid soil. Wet or badly drained soil is not suitable for roses.

The location of roses is often important. They require shelter from strong winds and storms, but will not give best results in shade. Rose plants in shaded situations may grow well but they need good sunlight to stimulate and perfect their blooming qualities. Roses are also intolerant of crowding and the roots of other plants should be kept at a respectable distance from them.

Preparation of Nicotine Dust Mixtures

Nicotine dust mixtures are prepared by carefully weighing out the required amounts of the material to be used. All the dry materials used are placed in a vessel for mixing, and the concentrated form of nicotine is sprinkled into the carrier. When large amounts of dust are prepared a barrel swung on an axle is used, and an opening made on the side of the barrel which is fitted with a tight-fitting door. The dry materials are placed inside of the barrel and the required amount of nicotine in the form of nicotine sulfate, or so-called "free nicotine" is sprinkled in on the dry material. About one-half peck of rounded, hard pebbles are placed in the barrel and the whole rotated for at least one hundred turns. The pebbles aid in making a complete mixture, and also have a grinding effect on the carrier used in making the dust. In preparing small amounts the required amount of nicotine is placed upon the dry material. which is known as the carrier, and the whole amount mixed by shaking it in some tight container, such as an empty lard pail. The mixture will be made more perfect if a small, cylindrical roll of screen wire of rather fine mesh is placed within the container with the dry material.

CARRIERS. Various materials have been tried as carriers for nicotine dust mixtures. Certain colloidal clays make a dust mixture which is slow in giving off the nicotine. Hydrated lime is one of the very good materials to use when rapid volatilization of the nicotine is desired. Sulfur may be used as a carrier, but is one of the materials which has no effect upon the rate of evolution of the nicotine. In the use of nicotine about the rose garden a very satisfactory dust material may be prepared by using eighty parts of fine dusting sulfur and twenty parts of hydrated lime as the carrier for nicotine dusts. At times it may be desired to add arsenate of lead to these dust mixtures. It usually is added at the rate of 10 pounds of the powdered form to 90 parts of the other carrier used. When a nicotine dust is prepared by the use of sulfur, hydrated lime, and arsenate of lead in the carrier the combination will take care of several of the diseases of rose; the sucking insects, such as aphids and thrips which may be present on the rose bush; and chewing insects, such as the rose slugs. A two per cent nicotine dust is recommended. To prepare a dust containing this much nicotine 8 ounces of nicotine sulfate solution containing 40 per cent nicotine, or a so-called "free nicotine" containing 40 per cent nicotine is used to each 10 pounds of carrier. A 1½ per cent nicotine dust is prepared by using 6 ounces of the concentrated nicotine mixtures. Nicotine dust mixture should be applied soon after they are prepared, since in the presence of hydrated lime the nicotine is rather rapidly lost. If the so-called "free nicotine" is used in the preparation of the dust the application is best made during the warmer parts of the day, while if the nicotine sulfate is used as a source of nicotine, the applications should be made when there is some moisture present on the plants.

Sulfur Dust for Roses

Sulfur is mentioned as a remedy for several rose diseases. While any well powdered sulfur is useful the best material to use for dusting purposes is the so-called dusting sulfur used for fruit trees, which is much more finely ground than the ordinary flowers of sulfur. The fine material is more easily applied, is more effective, and does not disfigure the leaves so much as the coarser sulfur. Because it is more effective it may be applied in somewhat less quantities.

Dust may be applied with a regular dusting machine of which there are a number on the market, varying from the small bellows type to the piston type and to those of larger capacity with hopper, crank, fan and hose. Any of these will answer. If none are available dust can be put on quite well by placing it in a square of loose cheesecloth gathering up the corners to form a bag and then beating this with a stick over the bush.

It is well to apply dust when the plants are moist with dew, after a rain, or after the garden hose has been used. A great amount of sulfur is not needed. After an application one should just be able to see the fine dust on the leaves. It is far better to make two light applications at intervals than one heavy one.

Mixing Spray Solutions

ARSENATE OF LEAD. Arsenate of lead for biting insects is used at the rate of 1½ pounds of the powdered form in 50 gallons of water; it is sometimes sold in paste form in which case double the above amount should be used. For making small amounts use 10 level teaspoonfuls of the powdered form to 1 gallon of water. Before adding the arsenate of lead to the water, it should be made into a thin paste by the addition of a small amount of water so it will mix readily. It is important to keep the solution well stirred while using to prevent settling.

NICOTINE. Nicotine is an extract of tobacco which is found on the market under various trade names, such as "Black leaf 40" and "free nicotine." It is used at the rate of 2 teaspoonfuls to a gallon of soapy water. Where these prepared forms are not available, a 10 cent pack of scrap tobacco put in a quart of warm water, and allowed to steep over night will provide a good nicotine spray material. The poured-off, or strained liquor is used for spraying.

BORDEAUX MIXTURE. To prepare Bordeaux mixture in gallon lots dissolve 1 heaping teaspoonful of copper sulfate crystals (use small crystals) in 1 quart of warm water in an earthenware or wooden vessel, and as soon as dissolved add 2 quarts of cool water. In another vessel add 5 heaping teaspoonfuls of fresh hydrated lime to 1 quart of cool water. Stir thoroughly and pass through a cloth strainer into the diluted copper sulfate water. Stir the mixture while the lime water is being added. The resulting blue solution is the desired Bordeaux mixture. This solution should be used at once. After standing for a few hours it is a dangerous mixture to place on foliage.

COMBINATION SPRAY. Where it is desirable to use all three of the above the following combination is suggested:

"Black leaf 40"	2 teaspoonfuls
Arsenate of lead (powdered)	10 level teaspoonfuls
Bordeaux mixture	1 gallon

SOAP. Where soap is used to make the spray material adhere, use enough soap to make the water definitely soft which generally takes about an ounce, or a teaspoonful to a gallon. Hard waters require more soap than soft.

Spray Schedule for Roses

The following control program will protect rose bushes from most of the common insects and diseases.

1. It is very important in the control of rust, mildew and leaf blotch to destroy by burning or burying all fallen leaves in autumn. The removal of all dead canes and stubs is also helpful in the control of some insects.

2. In spring before the buds open give rose bushes a dormant spray as for fruit trees, using lime—sulfur diluted 1 to 7, or a miscible oil (commercial spray oil) diluted at the rate of 1 part oil to 15 parts of water. Lime-sulfur will stain painted surfaces; in such cases it is best to protect the paint with paper or canvas, or use the oil spray. This treatment besides being of value as a general fungicide, will destroy scale insects and aphid eggs.

3. Dust when the first leaves are formed, using sulfur-dust alone, or a sulfur dust containing 2 per cent nicotine. This sulfur nicotine dust may be bought commercially or prepared at home. (See paragraph on preparing dusts p. 14). Where the sulfur dust is without nicotine and aphids are present an additional spray will be necessary. This should be made of either (1) nicotine sulfate, 2 teaspoonfuls to a gallon of soapy water, or (2) a 10-cent package of tobacco soaked over night in 1 quart of warm water. Repeat the nicotine application in either dust or spray form in three or four days to control aphids. When dust is used it may be applied by an ordinary hand duster, or it may be put in cheese cloth and shaken or beaten from this over the foliage.

4. Sulfur dust should be applied again two to three weeks later. This dust should contain 90 parts sulfur by weight and 10 parts of powdered arsenate of lead. This is obtainable commercially, but is easy to mix at home. If rose beetles are present it will be necessary to repeat this dusting at frequent intervals, since this material serves only as a repellent.

5. Further dustings of sulfur and lead arsenate may be needed at later intervals to control mildew on the susceptible Rambler types, and rose slugs which are likely to be plentiful on tea roses.